

## REMARKS

Claims 1-15 are pending in the present application. Upon entry of the instant amendments, Claims 1-6 as amended, and new Claims 16-32, will be pending.

Claims 8-15 have been canceled in response to a Restriction Requirement.

Claim 1 has been amended to better define certain embodiments of the invention, notwithstanding the Applicants' belief that the unamended claim would have been allowable, and without acquiescing to any of the Examiner's arguments, and without waiving the right to prosecute in the future the unamended (or similar) claims in another application, for the purpose of furthering the Applicants' business goals and expediting the patent application process in a manner consistent with the PTO's Patent Business Goals (PBG).<sup>1</sup> None of the amendments to the claims is related to the statutory requirements of patentability unless expressly stated so herein. No amendment made herein was intended to narrow the scope of any of the amended claims.

In particular, Claim 1 has been amended to add the phrase "wherein the skimmer operates by means of negative pressure." Support for the amendments is found throughout the specification (see, for example, page 11, line 25 to page 12, line 9).

New Claims 16-30 are directed to embodiments to which the Applicants had a right to claim. Specifically, new Claim 16 is directed to the subject matter of original Claim 1, and adds the element that the skimmer does not utilize water ballasts (support for this claim is found throughout the specification, as, for example, page 15, line 31 to page 16, line 7); Claims 17-21 depend from Claim 16. New Claim 22 depends from Claim 1, and adds the element that the skimmer does not utilize water ballasts (support for this claim is found throughout the specification, as, for example, page 15, line 31 to page 16, line 7); new Claims 23-26 depend from Claim 22. New Claim 27 is directed to the subject matter of original Claim 1, and adds the element of a description of the skimmer (support for this claim is found throughout the specification, as for example, on page 13, lines 8-22); new Claim 28 is dependent from Claim 27. New Claim 29 is directed to the subject matter of original Claim 1, and adds the element of a description of the skimmer (support for this claim is found throughout the specification, as for example, on page 15, lines 1-22); new Claim 30 is dependent from Claim 29. New Claims 31

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<sup>1</sup>65 Fed. Reg. 54603 (September 8, 2000).

and 32 are directed to subject matter of original Claim 1, wherein characteristics of the oil contaminant are described (support is found through out the specification, as for example page 6, line 10 through page 8, line 22, as well as by general knowledge of one of ordinary skill in the art about the oils which contaminate aqueous solutions as a result of an industrial activity, such as tramp oils).

In the Office Action dated October 4, 2002, the Examiner made a request and several rejections. For clarity, the request and rejections at issue are set forth by number in the order they are herein addressed:

- (1) The Examiner restricted the application to one of two groups of claims:

Group I: claims 1-7; and

Group II: Claims 8-16;

and requested that the Applicants affirm a telephonic election of Group I, and cancel the claims of Group II.

- (2) Claims 1-2 and 5 are rejected under 35 USC 102(b), as allegedly anticipated by Gore (US Pat No 5,948,266);

- (3) Claims 3-4 and 6-7 are rejected under 35 USC 103 as allegedly obvious over Gore (US Pat No 5,948,266); and

- (4) Claim 4 is rejected under 35 USC 112, second paragraph, as allegedly indefinite.

The Applicants would like to thank the Examiner for the telephone interview of January 16, 2003, to discuss the Office Action. Although the Applicants believed that the claims as pending were patentable, in an effort to expedite prosecution, the Applicants have amended the claims in accordance with the discussion with the Examiner. Thus, the Applicants believe that the following amendments and remarks traverse the Examiner's rejections of the claims. These remarks are presented in the same order as the above rejections.

## 1. **Restriction Requirement**

The Examiner restricted the application to one of two groups of claims (Office Action, pages 2-3):

Group I: claims 1-7, drawn to a method for removing an oil contaminant from the surface of an aqueous solution; and

Group II: Claims 8-16, drawn to a device/system for removing an oil contaminant from the surface of an aqueous solution.

The Applicants elected without traverse Group I, Claims 1-7, during a telephone conversation with the Examiner on September 30, 2002. The Applicants have also amended the claims in this response by canceling Claims 8-15. As a result of these amendments, Claims 1-7 remain pending.

## 2. The claims are not anticipated

Claims 1-2 and 5 are rejected under 35 USC 102(b), as allegedly anticipated by Gore (US Pat No 5,948,266). The Examiner simply refers to “col. 1, lines 54-57 where industrial applications is discussed” (Office Action, page 4).

The referred section states only that “[t]here is also a need for an efficient skimmer apparatus and method for removing a floating layer of liquid from a body of another liquid, other than water, in certain industrial situations and liquid purification operations” (Col. 1, lines 54-57). In contrast to the Examiner’s apparent assertion, these few lines, under the Background section, simply point out a need; they do not present a solution to that need. Indeed, the entire remaining specification is directed to a “small skimmer and associated apparatus in accordance with the invention...deployed in the event of a minor spill, such as at a boating marina” (col. 2, lines 1-5, under the summary of the invention). The only other time the word “industrial” is used in the specification is where it states that “[t]here are commercial and industrial situations where the partially contaminated oil can be reused or routed to a bio-reactor for clarification/reduction of contaminants” (col. 4, lines 51-53).

The cited reference, Gore, does not anticipate the rejected claims. A claim is anticipated only if each and every element as set forth in the claim is found in a single prior art reference (MPEP 2131). “The identical invention must be shown in as complete detail as is contained in the...claim.” (*Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989), as cited by MPEP 2131). Gore does not provide any description of any industrial situations for which the described skimmer might be used, nor does it indicate how the described skimmer might be used in any industrial situation. Therefore, the cited reference does not anticipate the Applicants’ claimed invention of Claim 1. Because both claims 2 and 5 are dependent from Claim 1, these claims are not anticipated by Gore as well.

Nevertheless, without acquiescing to the Examiner's rejection, but to further prosecution, and hereby expressly reserving the right to prosecute the original (or similar) claims, the Applicants have amended Claim 1 to indicate that the skimmer operates by means of negative pressure. Such means are neither taught nor suggested by the cited reference. The Applicants note that Gore repeatedly refers to using a pump (see, for example, col. 2, lines 45-58; col 4. line 4). The use of a pump is well known to shear oil, and to form an emulsion of surface oil with the underlying aqueous layer, resulting in a solution which is more difficult to separate. In contrast, with negative pressure, the fluid is just transported by the pressure rather than manipulated by a pump.

For these additional reasons, Gore does not anticipate amended Claim 1. As noted above, both claims 2 and 5 are dependent from Claim 1; therefore, these claims are not anticipated by Gore as well. Thus, the Applicants respectfully request the withdrawal of the rejection of Claims 1-2 and 5.

### **3. The claims are not obvious**

Claims 3-4 and 6-7 are rejected under 35 USC 103 as allegedly obvious over Gore (US Pat No 5,948,266). The Examiner asserts that, with respect to Claims 3 and 6, because Gore expressly teaches that his skimmer may be used in "certain industrial situations," it would have been obvious to employ the skimmer of Gore in industrial situations involving solutions stored in tanks (Office Action, page 4). The Examiner further asserts, with respect to Claim 7, the use of the skimmer of Gore would have been obvious in various "manufacturing" processes (Office Action, page 4).

The Applicants note that Claim 7 is directed to subject matter comprising removing a "batch" of an oil contaminant from the surface of an aqueous solution. The Applicants next note that the Examiner does not provide any reasons for specifically rejecting Claim 4; as this claim is not directed to specifically to subject matter comprising tanks or comprising removal of a batch or an oil contaminant, the grounds of rejections of Claims 3, 6 and 7 do not apply to Claim 4. Therefore, the Applicants respectfully request that this rejection of Claim 4 be reversed.

In contrast to the Examiner's assertion, that Gore expressly teaches that his skimmer may be used in "certain industrial situations," the Applicants have provided reasons above that Gore does NOT teach the use of his skimmer in industrial situations. Moreover, it would not have

been obvious to use the skimmer as described by Gore with a tank, especially as Gore repeatedly refers to oil spills in open bodies of water, such as occur in boating marinas and similar situations (see, for example, col. 1, lines 20-53; col. 2, lines 5-6) in which the skimmer is used from a shore, a dock, or a boat (see, for example, col. 3, lines 5-7, 12-13; col. 3, lines 62-63).

When obviousness is based on a single prior art reference, there must be a showing of a suggestion or motivation to modify the teachings of that reference to result in the claimed invention (*In re Kotzab*, 217 F.3d 1365, 1370, 55 USPQ2d 1313, 1316-1317 (Fed. Cir. 2000)). The Examiner has only provided a conclusion, that it would have been obvious to use the skimmer with a tank, without providing reasons why, or providing the requisite suggestion or motivation. Thus, the Examiner has not met the legal requirements to make a *prima facie* case of obviousness. For these reasons, Gore does not make the claimed invention obvious.

Nevertheless, without acquiescing to the Examiner's rejection, but to further prosecution, and hereby expressly reserving the right to prosecute the original (or similar) claims, the Applicants have amended Claim 1 to indicate that the skimmer operates by means of negative pressure. Because such means are neither taught nor suggested by the cited reference, Gore does not anticipate Claim 1, as noted above, and thus also does not make the claimed invention of Claims 3, 6, and 7 obvious.

#### 4. **Claim 4 is not indefinite**

Claim 4 is rejected under 35 USC 112, second paragraph, as allegedly indefinite, on the ground that it is unclear what the Applicants intend by the recitation of "way oils" and "hobbing oils" (Office Action, pages 4-5).

The Applicants note that these terms are well known and understood by those of ordinary skill in the art, which pertains to solutions contaminated by oils as a result of an industrial activity. The term "ways" is defined as "[b]earing surfaces used to guide and support moving parts of machine tools; may be flat, V-shaped, or dovetailed" (McGraw-Hill Dictionary of Scientific and Technical Terms, Fifth Edition (1994) editor in Chief Sybil P. Parker; McGraw-Hill, Inc. New York, NY), page 2157; copy enclosed under Tab 1). The term "Way Oils" is described as "[r]ecommended for lubrication of machine tool ways and slides, particularly where aqueous coolants are being used. Designed for conditions where extreme machining precision, slow feed rates or heavily loaded surfaces demand uniform motion" (From Industrial - Machine

Tool Way and Slide Oils, downloaded from the website on 12/30/02; copy attached under Tab 2). Additional characteristics of way oils are provided in references attached under Tabs 3 and 4.

The term "hobbing" is defined as [c]utting evenly spaced forms, such as gear teeth, on the periphery of cylindrical workpieces" and a "hobbing machine" as "[a] machine for cutting gear teeth in gear blanks or for cutting worm, spur, or helical gears" (McGraw-Hill Dictionary of Scientific and Technical Terms, Fifth Edition (1994) editor in Chief Sybil P. Parker; McGraw-Hill, Inc. New York, NY), page 942; copy enclosed under Tab 5). A "hobbing oil" is thus a cutting oil; an example of hobbing oils commercially available is described by Great Lakes Gear Technologies at their web site (downloaded on 12/30/02; a copy of the page is attached under Tab 6).

Thus, Claim 4 is not indefinite, and the Applicants respectfully request the withdrawal of the rejection of the claim on this ground.

### CONCLUSION

For the reasons set forth above, it is respectfully submitted that the Applicants' claims should be allowed. Should the Examiner believe that a telephone interview would aid in the prosecution of this application, the Applicants encourage the Examiner to call the Dr. Jaen Andrews at (608) 218-6900.

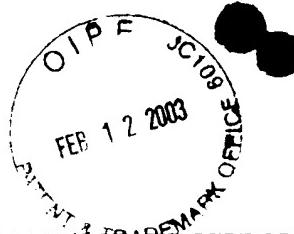
Dated: 2/4/03

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## APPENDIX I

### **MARKEUP VERSION OF REWRITTEN, ADDED, AND/OR CANCELLED PARAGRAPHS AND CLAIMS**

The following includes a marked-up version of the paragraphs and/or claims pursuant to 37 C.F.R. §§ 1.121 (b)(1)(iii) and 1.121 (c)(1)(ii) with instructions and markings showing changes made herein to the previous version of record of the claims. Brackets denote deleted text, and underlining denotes added text.

#### **IN THE CLAIMS:**

1. (Amended once) A method for removing a layer of an oil contaminant from the surface of an aqueous solution, comprising:

providing

a solution contaminated by oil as a result of an industrial activity, and

a surface skimmer which can be manually controlled from a remote location; and

manually controlling the surface skimmer to remove a layer of oil by the skimmer,

wherein the skimmer operates by means of negative pressure.

## APPENDIX II

### CLEAN VERSION OF THE ENTIRE SET OF PENDING CLAIMS AS AMENDED IN THIS COMMUNICATION

The following is a list of the claims as they would appear following entry of this amendment.

1. (Amended once) A method for removing a layer of an oil contaminant from the surface of an aqueous solution, comprising:  
providing  
a solution contaminated by oil as a result of an industrial activity, and  
a surface skimmer which can be manually controlled from a remote location; and  
manually controlling the surface skimmer to remove a layer of oil by the skimmer,  
wherein the skimmer operates by means of negative pressure.
2. A method according to Claim 1, wherein the industrial activity is selected from the group consisting of parts cleaning and washing, cutting and grinding, die casting, metal plating, heat treating, surface finishing, pressure washing, steam cleaning, cooling, lubricating, cleaning, and food processing.
3. A method according to Claim 1, where the solution is enclosed in a tank at a location of the industrial activity.
4. A method according to Claim 1, wherein the oil comprises hydraulic oils, surface finishing oils, quench oils, way oils, cutting, grinding and hobbing oils, and oils derived from food sources.
5. A method according to Claim 1, further comprising separating the aqueous solution from the oil contaminant removed from the solution surface.

6. A method according to Claim 1, further comprising separating the aqueous solution from the oil contaminant removed from the solution surface, wherein the industrial activity is selected from the group consisting of parts cleaning and washing, cutting and grinding, die casting, metal plating, heat treating, surface finishing, pressure washing, steam cleaning, cooling, lubricating, cleaning, and food processing, wherein the solution is enclosed in a tank at a location of the industrial activity, wherein the oil comprises hydraulic oils, surface finishing oils, quench oils, way oils, cutting, grinding and hobbing oils, and oils derived from food sources.

16. (New) A method for removing a layer of an oil contaminant from the surface of an aqueous solution, comprising:

providing

a solution contaminated by oil as a result of an industrial activity, and  
a surface skimmer which does not utilize water ballasts and which can be manually controlled from a remote location; and

manually controlling the surface skimmer to remove a layer of oil by the skimmer.

17. (New) A method according to Claim 16, wherein the industrial activity is selected from the group consisting of parts cleaning and washing, cutting and grinding, die casting, metal plating, heat treating, surface finishing, pressure washing, steam cleaning, cooling, lubricating, cleaning, and food processing.

18. (New) A method according to Claim 16, where the solution is enclosed in a tank at a location of the industrial activity.

19. (New) A method according to Claim 16, wherein the oil comprises hydraulic oils, surface finishing oils, quench oils, way oils, cutting, grinding and hobbing oils, and oils derived from food sources.

20. (New) A method according to Claim 16, further comprising separating the aqueous solution from the oil contaminant removed from the solution surface.

21. (New) A method according to Claim 16, further comprising separating the aqueous solution from the oil contaminant removed from the solution surface, wherein the industrial activity is selected from the group consisting of parts cleaning and washing, cutting and grinding, die casting, metal plating, heat treating, surface finishing, pressure washing, steam cleaning, cooling, lubricating, cleaning, and food processing, wherein the solution is enclosed in a tank at a location of the industrial activity, wherein the oil comprises hydraulic oils, surface finishing oils, quench oils, way oils, cutting, grinding and hobbing oils, and oils derived from food sources.
22. (New) A method according to Claim 1, wherein the skimmer does not utilize water ballasts.
23. (New) A method according to Claim 22, wherein the industrial activity is selected from the group consisting of parts cleaning and washing, cutting and grinding, die casting, metal plating, heat treating, surface finishing, pressure washing, steam cleaning, cooling, lubricating, cleaning, and food processing.
24. (New) A method according to Claim 22, wherein the oil comprises hydraulic oils, surface finishing oils, quench oils, way oils, cutting, grinding and hobbing oils, and oils derived from food sources.
25. (New) A method according to Claim 22, further comprising separating the aqueous solution from the oil contaminant removed from the solution surface.
26. (New) A method according to Claim 22, further comprising separating the aqueous solution from the oil contaminant removed from the solution surface, wherein the industrial activity is selected from the group consisting of parts cleaning and washing, cutting and grinding, die casting, metal plating, heat treating, surface finishing, pressure washing, steam cleaning, cooling, lubricating, cleaning, and food processing, wherein the solution is enclosed in a tank at a location of the industrial activity, wherein the oil comprises hydraulic oils, surface finishing oils, quench oils, way oils, cutting, grinding and hobbing oils, and oils derived from food sources.

27. (New) A method for removing a layer of an oil contaminant from the surface of an aqueous solution, comprising:

providing

a solution contaminated by oil as a result of an industrial activity, and

a surface skimmer which can be manually controlled from a remote location, and

manually controlling the surface skimmer to remove a layer of oil by the skimmer,

wherein the skimmer comprises a hollow tube with two ends and two openings,

wherein a first opening is a skimmer inlet, where the inlet is an opening cut

horizontally along the tube, and close to a first end which is closed,

and wherein a second opening is a skimmer outlet, and is a second end which is open and which can be connected to the conduit.

28. (New) The method of Claim 27, wherein the skimmer operates by means of negative pressure.

29. (New) A method for removing a layer of an oil contaminant from the surface of an aqueous solution, comprising:

providing

a solution contaminated by oil as a result of an industrial activity, and

a surface skimmer which can be manually controlled from a remote location, and

manually controlling the surface skimmer to remove a layer of oil by the skimmer,

wherein the skimmer comprises

a hollow tube with two ends and two openings,

where a first end of the tube is partially closed and comprises an inlet, where the inlet extends along the tube from the partially closed first end,

and where a second end of the tube is open and comprises an outlet,

and further where the tube is angled between the first and the second end.

30. (New) The method of Claim 29, wherein the skimmer operates by means of negative pressure.

31. (New) A method for removing a layer of an oil contaminant from the surface of an aqueous solution, comprising:

providing

a solution contaminated by oil as a result of an industrial activity, and

a surface skimmer which can be manually controlled from a remote location; and manually controlling the surface skimmer to remove a layer of oil by the skimmer,

wherein the oil contaminant comprises at least one of: a particle of metal, rust, dirt, or soot; a microorganism contaminant; a mixture of more than one oil; an additive of an emulsifier, friction reducer, or defoamer; or an acid or base.

32. (New) A method for removing a layer of an oil contaminant from the surface of an aqueous solution, comprising:

providing

a solution contaminated by oil as a result of an industrial activity, and

a surface skimmer which can be manually controlled from a remote location; and manually controlling the surface skimmer to remove a layer of oil by the skimmer,

wherein a source oil of the oil contaminant is a mixture of at least one oil and at least one additive and is manufactured or blended for an industrial activity.

**wax-block photometer** See Joly photometer. ( 'waks 'bläk fô:täm-pôr )

**wax-coating machine** [GRAPHICS] A machine that applies a pressure-sensitive coating of wax to the backs of proofs, stats, photos, overlays, and other materials. ( 'waks 'kö:dîng mäshén )

**wax distillate** [MATER] A neutral distillate from distillation of crude oil that contains a high percentage of crystallizable paraffin wax; used as a primary base for paraffin wax and neutral lubricating oils. ( 'waks 'dis-tälät )

**waxed paper** [MATER] Paper that is treated or coated with wax to make it waterproof and greaseproof; used for wrapping. ( 'wakst 'pä-pär )

**wax engraving** [GRAPHICS] A type of letterpress platemaking, used especially for ruled forms, in which lines of type are impressed in wax, resulting in a mold suitable for electrotyping. ( 'waks-in grâv-ing )

**wax fractionation** [CHEM ENG] A continuous solvent-recovery/crystallization petroleum-refinery process for the production of waxes with low oil content from wax concentrates; for example, MEK (methyl ethyl ketone) deoiling. ( 'waks ,frak-shä'nashen )

**wax gland** See ceruminous gland. ( 'waks ,gland )

**waxing moon** [ASTRON] The moon between new and full, when its visible part is increasing. ( 'waks-ing 'mün )

**wax manufacturing** [CHEM ENG] A petroleum refinery process similar to wax fractionation for the manufacture of oil-free waxes by chilling and crystallization from a solvent. ( 'waks ,man-fäk-chä-ring )

**wax master** See wax original. ( 'waks 'mas-tär )

**wax original** [ENG ACOUS] An original recording made on a wax surface and used to make a master. Also known as wax master. ( 'waks a'rijän-əl )

**wax stain** [MATER] A semitransparent pigment mixed with beeswax, and thinned with turpentine. ( 'waks 'stän )

**wax tailings** [MATER] A sticky, pitchlike substance with dark-brown color, the last volatile product distilling off an oil charge before it is coked; used as wood preservative and in manufacture of roofing paper. Also known as petroleum tailings; still wax. ( 'waks 'täl-iñz )

**waxy** [MINERAL] A type of mineral luster that is soft like that of wax. ( 'wak-së )

**waxy-electrolyte battery** [ELEC] A primary battery in which the electrolyte is a waxy material, such as polyethylene glycol, in which is dissolved a small amount of a salt, such as zinc chloride; the electrodes are frequently made of zinc and manganese dioxide, and the electrolyte is melted and painted on a paper sheet to form the separator. ( 'wak-së i;lek'trä-lit 'bad-ë-rë )

**way point** [CONT SYS] See via point. [NAV] A reference point between the point of departure and the destination, particularly a point on a course line the coordinates of which are defined in relation to an electronic aid to navigation. ( 'wā ,point )

**ways** [CIV ENG] 1. The tracks and sliding timbers used in launching a vessel. 2. The building slip or space upon which the sliding timbers or ways, supporting a vessel to be launched, travel. [MECH ENG] Bearing surfaces used to guide and support moving parts of machine tools; may be flat, V-shaped, or dovetailed. ( wäz )

**Wb** See weber.

**W boson** [PARTIC PHYS] An intermediate vector boson with positive or negative electric charge that mediates the charged-current weak interactions. Also known as W particle. ( 'däb-əl,yü ,bô,sän )

**W coefficient** See Racah coefficient. ( 'däb-əl,yü ,kô:î,fish-ənt )

**weak acid** [CHEM] An acid that does not ionize greatly; for example, acetic acid or carbonic acid. ( 'wék 'as-äd )

**weak convergence** [MATH] A sequence of elements  $x_1, x_2, \dots$  from a topological vector space  $X$  converges weakly if the sequence  $f(x_1), f(x_2), \dots$  converges for every continuous linear functional  $f$  on  $X$ . ( 'wék kän'verjäns )

**weak coupling** [PARTIC PHYS] The coupling of four fermion fields in the weak interaction, having a strength many orders of magnitude weaker than that of the strong or electromagnetic interactions. ( 'wék 'kôp-üñg )

**weak energy condition** [RELAT] The condition in general

relativity theory that all observers see a nonnegative energy density. ( 'wék 'en-ärjë kän,dish-ən )

**weak fix** [NAV] A fix determined from horizontal sextant angles between objects poorly located. ( 'wék 'fiks )

**weak ground** [MIN ENG] Roof and walls of underground excavations which would be in danger of collapse unless suitably supported. ( 'wék 'gränd )

**weak interaction** [PARTIC PHYS] One of the fundamental interactions among elementary particles, responsible for beta decay of nuclei, and for the decay of elementary particles with lifetimes greater than about  $10^{-10}$  second, such as muons,  $K$  mesons, and lambda hyperons; it is several orders of magnitude weaker than the strong and electromagnetic interactions, and fails to conserve strangeness or parity. Also known as beta interaction. ( 'wék ,intär'ak-shän )

**weak-line T Tauri star** [ASTRON] A T Tauri star that lacks strong emission lines in its optical spectrum, and lacks both strong stellar winds and a circumstellar accretion disk. Also known as naked T Tauri star; weak T Tauri star. ( 'wék ,lin 'të 'tôrë ,stăr )

**weakly complete space** [MATH] A topological vector space in which an element  $x$  is associated with any weakly convergent sequence of elements  $x_n$  such that the limit of  $f(x_n)$  equals  $f(x)$  for any continuous linear functional  $f$ . ( 'wék 'lé kän'plët 'späs )

**weakly interacting massive particle** [PARTIC PHYS] A hypothetical massive elementary particle, interacting only through gravity and the weak nuclear interaction. Abbreviated WIMP. ( 'wék 'lé ,in-tär'ak-tiñj 'mas-iv 'pärd-ə-käl )

**weak topology** [MATH] A topology on a topological vector space  $X$  whose open neighborhoods around a point  $x$  are obtained from those points  $y$  of  $X$  for which every  $f(x)$  is close to  $f(y)$ ,  $f$ , appearing in a finite list of linear functionals. ( 'wék ta'päl-əjë )

**weak T Tauri star** See weak-line T Tauri star. ( 'wék 'të 'tôrë ,stăr )

**weapon** [ORD] An instrument of combat, either offensive or defensive, used to destroy, injure, defeat, or threaten an enemy; for example, a gun, bayonet, bomb, or missile. ( 'wep-ən )

**weapon delivery** [ORD] The total action required to locate the target, establish the necessary release conditions, and maintain guidance to the target if required; it includes the detection recognition and the acquisition of the target, and the weapon release and weapon guidance. ( 'wep-ən di,liv-ə-rë )

**weapon of mass destruction** [ORD] Nuclear, bacteriological, or other weapon capable of causing widespread death or destruction. ( 'wep-ən əv 'mas di'strük-shän )

**weapon record book** [ORD] Record book used to keep data on the performance, maintenance, and inspection of a gun or other weapon. ( 'wep-ən 'rek-ərd,bük )

**weapons system** [ORD] Two or more instruments of combat operating as a single unit of striking power in military combat; specifically, a system in which two instruments of combat are required to perform a single mission. ( 'wep-ən ,sistema )

**weapon target line** [ORD] An imaginary straight line from a weapon to a target. ( 'wep-ən 'tärgët ,lin )

**wear** [ENG] Deterioration of a surface due to material removal caused by relative motion between it and another part. ( wer )

**wearing course** [CIV ENG] The top layer of surfacing on a road. ( 'wér-iñg ,kôrs )

**wear tables** [ORD] Tables indicating the decrease of muzzle velocity expected as the result of firing a certain number of equivalent rounds; although tubes may vary considerably from the wear rate indicated in such tables, the tables may be used to correct calibration data between periods of calibration. ( 'wér ,tä-bôlz )

**weasel** [VERT ZOO] The common name for at least 12 species of small, slim carnivores which belong to the family Mustelidae and which have a reddish-brown coat with whitish underparts; species in the northern regions have white fur during the winter and are called ermine. ( 'wé-zäl )

**weather** [METEOROL] 1. The state of the atmosphere, mainly with respect to its effects upon life and human activities; as distinguished from climate, weather consists of the short-term (minutes to months) variations of the atmosphere. 2. As used in the making of surface weather observations, a category of individual and combined atmospheric phenomena which must be drawn upon to describe the local atmospheric activity at the time of observation. ( 'weth-ər )

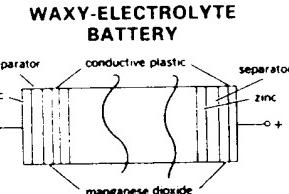
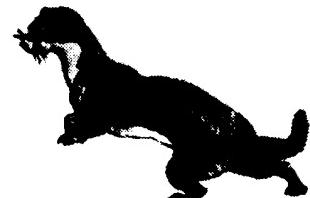


Diagram of battery stack of cells using a waxy electrolyte.

### WEASEL



The common or European weasel (*Mustela nivalis*).

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## Waylube Way Oils

[Click Here for Material Safety Data Sheet](#)

	Product	API Code	Viscosity								
			cSt 40C	cSt 100C	SUS 100F	SUS 210F	VI	Pour Pt.,F	Flash Pt.,F	Copper Corrosion	
	Waylube Way Oil 32	610	32.6	31	5.2	160	44	97 -27	399	1A	
	Waylube Way Oil 46	611	31.8	45	6.6	232	48	97 -22	424	1A	
	Waylube Way Oil 68	612	30.9	66	8.4	342	55	97 -25	455	1A	
	Waylube Way Oil 100	613	29.6	101	11.1	528	64	95 -11	460	1A	
	Waylube Way Oil 150	614	28.5	150	14.5	798	78	95 0	475	1A	
	Waylube Way Oil 220	615	28.0	220	18.0	1105	93	95 5	489	1A	
	Waylube Way Oil 460	617	25.9	460	29.0	2346	140	91 12	529	1A	

### WAY OILS ISO 68 and 220

Fleetline Way Oils ISO 68 and 220 are premium quality machine oils, formulated with premium paraffinic base stocks to provide optimal performance over extended periods of time. These base oils display a rich, dark color which identifies them as high-quality way lubes, refined from virgin Penn-Grade crude oil.

These oils are fortified with non-staining lubricity aids to help eliminate "stick-slip" and the leap-frog motion of the machine tool table on its way. The incorporation of tackifiers keeps the fluid in place on both horizontal and vertical ways, and assures smooth table action – even at low speeds – under heavy work loads.

These quality way oils are formulated with:

- Excellent metal-wetting properties
- Excellent rust preventatives and lubricity
- Excellent tackiness and adhesion properties

Fleetline Way Oils ISO 68 and 220 are recommended for slides and ways of planers, grinders, millers, lathes, screw machines, drilling machines, boring machines, and other tools and machines. These products may also be applied to the bearings and gears of other machinery requiring the special properties of a quality way oil.

**Fleetline Way Oil ISO 68** is classified as a medium-heavy way oil and **Fleetline Way Oil ISO 220** is classified as a heavy way oil.

**Fleetline Way Oils ISO 68 and 220** are designed to meet these manufacturer's requirements for:

- Cincinnati Milacron P-47 (ISO 68)
- Cincinnati Milacron P-50 (ISO 220)
- ... and others

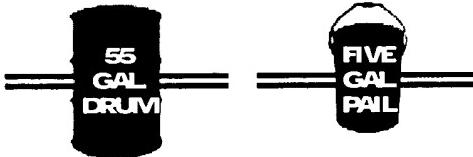
Always refer to equipment manual regarding correct viscosity grade and performance level requirements.

#### PACKAGING:

##### VISCOSITY GRADES

**ISO  
68**

**ISO  
220**



Part No. FLE 6401

Part No. FLE 6402

Part No. FLE 6301

Part No. FLE 6302

## Superior Performance



## PRODUCT SPECIFICATIONS

### WAY OILS ISO 68 and 220

TEST DESCRIPTION	ASTM METHOD	TYPICAL ANALYSIS	
ISO Viscosity Grade	-	68	220
API Gravity	D 1298	30.3	28.1
Viscosity, Kinematic, cSt at 40°C (104°F)	D 445	68	220
Viscosity, Kinematic, cSt at 100°C (212°F)	D 445	9.3	6.3
Viscosity, Saybolt, SUS at 38°C (100°F)	D 2161	315	1019
Viscosity, Saybolt, SUS at 99°C (210°F)	D 2161	55.6	46.5
Viscosity Index	D 2270	112	102
Flash Point (Cleveland Open Cup), °C (°F)	D 92	210° (410°)	237° (460°)
Pour Point, °C (°F)	D 97	-15° (5°)	-12° (10°)
Sulfur Content, ppm	D 4927	3100	3100
Color	D 1500	8.0	8.0

Date Approved: 4/15/02 (Specification valid only if dated)

Typical test data are average values only.  
Minor variations which do not affect performance may occur.

#### KEEP AMERICA ENERGY EFFICIENT

Improper disposal of used oil poses serious hazards to human health and the environment and depletes a valuable non-renewable resource. Return used oil for proper disposal and recycling.

#### CAUTION

Continuous contact with USED oil has caused skin cancer in laboratory mice. Protect your skin by washing with soap and water.



**H Monel** [MET] A Monel containing 3.2% silicon available in cast form; it is harder and stronger than Monel. { 'äch mö,nel }

**HMPA** See hexametapol.

**HMXRB** See high-mass x-ray binary.

**H network** [ELECTR] An attenuation network composed of five branches and having the form of the letter H. Also known as H attenuator; H pad. { 'äch ,net,wärk }

**Ho** See holmium.

**hoar crystal** [HYD] An individual ice crystal in a deposit of hoarfrost; always grows by sublimation. { 'hör ,krist-əl }

**hoarding behavior** [VERT ZOO] The carrying of food to the home nest for storage, in quantities exceeding daily need. { 'hörd-ing bi,häv-yär }

**hoarfrost** [HYD] A deposit of interlocking ice crystals formed by direct sublimation on objects. Also known as white frost. { 'hör,fröst }

**hoarhound** See marrubium. { 'hör,haund }

**hoarse** [MED] Having a harsh, discordant voice, caused by an abnormal condition of the larynx or throat. { hörts }

**hoary** [BOT] Having grayish or whitish color, referring to leaves. { hörē }

**hob** [DES ENG] A master model made from hardened steel which is used to press the shape of a plastics mold into a block of soft steel. [MECH ENG] A rotary cutting tool with its teeth arranged along a helical thread; used for generating gear teeth. { häb }

**hobber** See hobbing machine. { 'häb-ər }

**hobbling** [DES ENG] In plastics manufacturing, the act of creating multiple mold cavities by pressing a hob into soft metal cavity blanks. [MECH ENG] Cutting evenly spaced forms, such as gear teeth, on the periphery of cylindrical workpieces. { 'häb-ing }

**hobbing machine** [MECH ENG] A machine for cutting gear teeth in gear blanks or for cutting worm, spur, or helical gears. Also known as hobber. { 'häb-ing mö,shén }

**hobbing steel** [MET] A high-speed steel used to make gear teeth cutters. { 'häb-ing stiel }

**hobnail** [DES ENG] A short, large-headed, sharp-pointed nail; used to attach soles to heavy shoes. { 'häb,näl }

**hobo connection** [ENG] A parallel electrical connection used in blasting. { 'hō-bō kə,nek-shən }

**hoc** [CIV ENG] A tray fitted with a handle by which it can be carried on the shoulder for transporting bricks or mortar. { häd }

**Hodge conjecture** [MATH] The  $2p$ -dimensional rational cohomology classes in an  $n$ -dimensional algebraic manifold  $M$  which are carried by algebraic cycles are those with dual cohomology classes representable by differential forms of bidegree  $(n-p, n-p)$  on  $M$ . { 'hāj kän,jek-chär }

**Hodgkin's disease** [MED] A disease characterized by a neoplastic proliferation of atypical histiocytes in one or several lymph nodes. Also known as lymphogranulomatosis. { 'hāj,kän di,zēz }

**hodgkinsonite** [MINERAL]  $MnZnSiO_5 \cdot H_2O$  A pink to reddish-brown mineral composed of hydrous zinc manganese silicate; occurs as crystals. { 'hāj-kän-sö,nit }

**Hodgson number** [CHEM ENG] Method of predicting the metering error during pulsating gas flow when a surge tank is located between the pulsation source (pump or compressor) and the meter (orifice, nozzle, or venturi). { 'hāj-sən ,nəm-bər }

**hodograph** [PHYS] 1. The curve traced out in the course of time by the tip of a vector representing some physical quantity. 2. In particular, the path traced out by the velocity vector of a given particle. { 'hād-ə,graf }

**hodograph method** [FL MECH] A method for studying two-dimensional steady fluid flow in which the independent variables are taken as the components of the velocity with respect to cartesian or polar coordinates, rather than the coordinates themselves. { 'hād-ə,graf ,meth-əd }

**hodoscope** [NUCLEO] An array of small Geiger counters, scintillation counters, or other radiation counters used in tracing paths of high-energy particles in experiments with particle accelerators or in cosmic rays. [OPTICS] See conoscope. { 'hād-ə,sköp }

**Hodotermitidae** [INV ZOO] A family of lower (primitive) termites in the order Isoptera. { 'hād-ō-tär'mid-ə,dē }

**hoe** [DES ENG] An implement consisting of a long handle with a thin, flat, straight-edged blade attached transversely to the end; used for cultivating and weeding. { hō }

## hoghorn

[HYD] A blackbody.

[MINERAL]

burnt orange and

hydrated basic

orbital

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**Sybil P. Parker**

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# **Apollo America Corp.**

## **Test comparisons**

**Daphne Magplus HS32-U Hobbing Oil**  
**Daphne Cut BR60-U Broaching Oil**

Comparisons of Apollo Daphne metalworking lubricants versus existing hobbing and broaching oils at an automotive transmission plant.

**Introduction:** These cutting oils were specifically designed to reduce the health hazards and environmental impact of oil products, while simultaneously increasing the performance and reducing the purchase, use, and disposal costs. This required the elimination of hazardous chlorine and active sulfur additives. The solution was found by using a less costly and better performing organic molybdenum EP alternative, non-active sulfur compounds, and better quality and lighter virgin oils.

**Specific Items Compared**

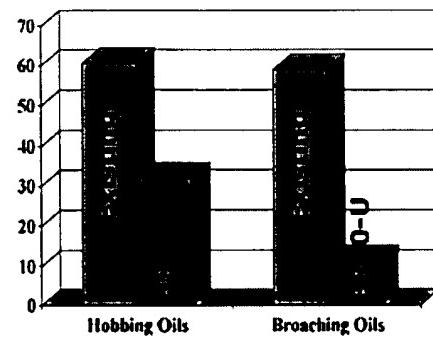
- Viscosity
- Color
- Corrosiveness
- Chlorine content
- Odor

## **Viscosity**

- Viscosity is a measurement of the oil's thickness or resistance to flow
- Evaluated using ASTM D-445
- Higher viscosity fluids have greater "carry-off", or rate of consumption
- Lower viscosity fluids flush away chips more efficiently, and remove heat more quickly
- Lower viscosity fluids can be applied at lower pressure, reducing mist amounts.

**Viscosity comparison**

**Viscosity @ 40C**  
Daphne Magplus HS32-U = 32cSt  
Current Hobbing Oil = 60.72cSt  
Daphne Cut BR60-U = 11.13cSt  
Current Broaching Oil = 59.18cSt



## Color

- Lubricants can range from clear to dark black in color.
- Evaluated using ASTM D-1500 to evaluate color
- Results can range from L0.5 to D8.0

### Color Comparison



#### Hobbing

- Daphne Magplus HS32-U = Light Green (L3.0)
- Current Hobbing Oil = D8.0

#### Broaching

- Daphne Cut BR60-U = L1.5
- Current Broaching Oil = D8.0

## Corrosiveness

- Copper Corrosion Test evaluates a lubricants tendency to corrode tools, machines, and parts
- Active-type sulfur and Chlorine EP agents will corrode copper, bronze and other yellow metals (such as bushings and guide ways)
- Evaluated using ASTM D-130
- Results = 1A (mild) to 4C (very corrosive)

1a	Slight Tarnish
1b	
1c	
2a	Moderate Tarnish
2b	
2c	
2d	
2e	
3a	Dark tarnish
3b	
4a	Corrosion
4b	
4c	Very Corrosive

### Copper strip comparison

#### Hobbing

- Daphne Magplus HS32-U = 1A
- Current Hobbing Oil = 4C

#### Broaching

- Daphne Cut BR60-U = 1B
- Current Broaching Oil = 4C

## Chlorine content

- Chlorine and chlorinated paraffins are Extreme Pressure (EP) agents used in metal working lubricants
- Evaluated using ASTM D 808
- Results are given in wt %
- Although helpful for tool life they are a health hazard and disposal problem

### Chlorine Comparison

#### Hobbing

- Daphne Magplus HS32-U = 0.00 % Cl
- Current Hobbing Oil = 3.304 % Cl

#### Broaching

- Daphne Cut BR60-U = 6% Cl (Non-active type)

- Current Broaching Oil = 5.716% Cl (Active type)

## Odor

### Hobbing

- Daphne Magplus HS32-U - Mild, light odor
- Current Hobbing Oil - Distinct petroleum odor

### Broaching

- Daphne Cut BR60-U - Mild, light odor
- Current Broaching Oil - Distinct petroleum odor

### Causes of Odor

Odor is caused by two main factors:

- Low quality Base Oils
- Active type Sulfur additives

Daphne metalworking fluids have a mild, light odor due to the high quality, narrow-cut base oils. Also, due to their Non-active chemistry, the strong sulfur smell, common to many cutting oils, is greatly reduced.

## Conclusions

### Using Daphne Hobbing and Broaching oils will provide:

- Reduced oil consumption due to lower viscosity which means less carry off
- Easier viewing of oil contamination, effectiveness of filtration, parts and tools due to the lighter color
- Much less machine wear & part corrosiveness due to the Non-Active type chemistry
- The elimination or reduction in hazardous Chlorine and in the workplace
- Lower odor, mist levels, and substantially reduced tendency of skin irritations
- Lower flash point due to use of higher quality virgin oils

## Recommendations

Great Lakes and Apollo America Corp. will assist your engineers with the selection and acquisition of suitable cutting fluids for evaluation. In plant performance testing and comparisons:

- Testing for cutting fluid performance: 20-30% improvements in tool life have been achieved in similar gear hobbing and broaching studies.
- Reduced consumption due to less carry-off - also the use of spin stations or part air blow downs are more effective.
- Increased operator acceptance and comfort due to lower odors, mist levels, and substantially reduced tendency of skin irritations.
- Reduced purchase costs, oil maintenance and disposal problems.

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